

Possibilities for Environmental Education at the Department of Geography

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Abstract

Environmental education has been considered as a necessary requirement for present university education, because it involves an effort to teach about natural environments function and how human activities can manage their behaviour and ecosystems in order to live sustainably. However, the world is rapidly becoming a more complex place. As a result, we must expect greater academic achievement from our students today to be adequately prepared for the challenges of tomorrow. The Faculty of Education offers many subjects dealing with the environment. On one hand they are understood as a tool how to protect the nature – the ecosystem approach – on the other hand it is considered as an environment with human and nature relations – the geosystem approach. Geography subjects are more focused on the landscape synthesis. Nowadays Standards for Environmental Education are being developed at the Department of Geography as a response to curriculum revision.

Key words: environmental education, fieldwork, subject integrity, environmental surveys

Introduction

The Ministry of Education, Youth and Sports (MEYS) has been promoting education for environmental care since 1960's; it was known as an ecological education in the 1980s, and now it is named environmental education. From the beginning it was aimed to reinforce an interest in organisms and nature and so lead to responsible behaviour to the world, people and nature (MEYS, 2008). Environmental education and enlightenment (EEE) appeared in the Czech legislature in 1992 and since 1998 administrative regions have the duty to create conception of EEE and establish regional integrated systems of EEE.

In 2008 the Strategy of education for sustainable development in the Czech Republic was accepted on the basis of the Strategy of European economic commission of UN in the sphere of education for sustainable development (accepted in 2005 in Vilnius). It is among others aimed at an understanding of integrity and the relationships between the economic, social and environmental development of an aspect on local, regional and global level. Simultaneously it differentiates objectives, contents, methods and means of education according to different student ages and degree of individuality. Environmental education is set in many school documents in its form but considering the short period of availability in school education it has unfortunately been split into many subjects isolated from each other. There is also the possibility to create a new subject (Environmental education or Environment) but even this is not a novelty because many schools have already been teaching it for a couple of years.

However it is named and whatever its varied content, it should teach our students to ask questions, search for solutions and alternatives, argue, discuss, communicate and especially be able to choose fundamental information from the number of reports which should be helpful in further action and behaviour (Hynek, 2000).

One final question remains. Who other than a geographer could be able to teach subject like this? Especially as geographers gain, through their education, a spatial view of economic, social, environmental and political task handling from the different points of view (physical and human geography). This argument should be sufficient when preparing a new generation of teachers because we should lead them to the development of skills mentioned above. Sometimes the implementation into university education seems to be more difficult in fact that many pieces of knowledge and skills are separated not only in study programmes but even inside one course. Environmental education needs the integrity of all subjects and an approach from many points of view but leading to one common conclusion. So, it should not be separated from information provided by biology, physics, chemistry, history, art education etc. Therefore this paper is dedicated to so necessary subjects' integrity which are applied in the new study programmes at the Department of Geography.

Subjects Dealing Especially With Environmental Education

Besides geography teaching in geography study programme, the Department of Geography at Masaryk University ensures teaching in subjects in non-geography study programmes where it guarantees teaching of Geographical practicum and an integrated scientific basis. Within geography teaching there is an effort to implement environmental education in all taught subjects. Emphasis is laid especially on following courses:

- Environmental education
- Landscape and environment
- Fieldwork and excursions
- Integrated fieldwork education

Environmental education

This subject is theoretically based and taught as a common basis in all teaching combinations and deals with the fundamental paradigm of current society. It provides information about processes patterns necessary to lead to the understanding of situations as they progress. The teaching is carried out using lectures with the representation of all subjects concerned: biology, geography, physics and chemistry. Lectures consist of following themes: ecology and environmentalism, landscape, chemistry of the environment, energy and vibration in the environment. The subject is completed with a colloquium and written exam and seminar work documenting environmental SWOT analysis of a chosen area. Integrated fieldwork education is undertaken.

Landscape and environment

The aim of this subject, taught in geography study programme, is to get an overview of time-spatial integration and relationship among landscape components and elements and the time-spatial sequence of territorial components of nature and current landscape. Emphasis is laid mainly on different landscape types and processes which provoked changes in the landscape. In practical courses students have the opportunity to develop landscape mapping, they construct landscape profiles, identify changes in the landscape and suggest solution about how to avoid landscape change or eliminate the undesirable impacts and retrieve affected parts of the landscape. All mentioned skills are to be developed on specific examples from all over the world.

Integrated fieldwork education

This subject spreads a theoretic basis of environmental education. It has been taught in many ways according to a specification of study programme. The fieldwork is situated in the field study laboratories belonging to the Department of Geography, Faculty of Education, Masaryk

University in Brno. It is located nearby the Jedovnice village in the beautiful landscape on the border of Moravian Karst and Dražanská vrchovina Highland 35 km north of the city Brno. Purposed integrated fieldwork education is focused especially on environmental education and professional preparation of future teachers using various progressive methods such as observations, centre research, project solving etc. (Hofmann and Kolejka, 2005). The fieldwork is based on work with worksheets which can be used by pupils, students and teachers in the field. In the case of adverse weather conditions, many of them can be completed inside the field centre. They are easily printed and copied. Authors decided to create such worksheets as they will be easily understood by pupils from elementary schools. Some of them are focused on teacher's work as a preparation before the fieldwork in the terrain. According to this helpful manual, the teacher can assign more difficult tasks individually to more advanced pupils or students. Worksheets can be also modified and used for different age groups (Hofmann *et al.*, 2003).

Though there is a need of complex view on the specific part of the landscape worksheets are distributed to individual participating subjects. It does not mean that these activities stand alone. For example the quest to the village Rudice offers us a look back to the history where we can observe the first human activities affiliated with the environment. The same approach can be illustrated in cognition of biotic and abiotic factors of the nature or the work with different types of nature materials. It depends only on a teacher which of offered variant will be chosen according to offered possibilities. These activities are in modifications (Table 1) offered to elementary and secondary schools, students from other universities take also part in this fieldwork education.

Table 1. Activities offered to elementary and secondary schools

Date:	
Address of the school:	
Number of children:	Age: Teachers:
Students (requirement for the number of students-instructors):	
Number of days:	
Arrival:	at:
Departure:	at:
Activities (tick activities you are interested in)	
Acquisition and processing of geographic data about the territory from maps, aerial photographs and simple field measurements. (The preparation takes place at school, the measurements and field work continuously during the sojourn).	
Orientation in the field by orienteering map. Duration: continuously, each morning. (Maps and three trails of different complexity are prepared).	
Economic activities of humans in the landscape – field exercise. Duration: 7 hours (The entire region was stigmatized by iron ore mining and processing. There are also notable karst phenomena to be observed – combined with a visit to the museum in Rudice. The longer variant includes a visit to iron works in the Josefovské údolí Valley; back from town Adamov by public service bus).	
Environment perception. Working with the plan – Duration: 3 hours (Work with the plan on a scale 1:1000 in couples. Plotting of the existing situation, assessment of the degree of damage to environment, plotting of illegal landfills, assessment of the quality of objects, easy orientation by chalet numbers).	
Questionnaire inquiries (traffic density, equipment and availability of service network, environment quality, local traditions, etc.). Duration: continually during the whole day.	
Meteorological measurements and observations – continually during the sojourn.	
Arboretum of the Faculty of Forestry, Mendel University of Agriculture and Forestry – field exercise. Duration: 4 hours (Walk by the map, programme in the Arboretum is prepared for different instructional school levels).	
Valley of Tranquility – Rakovecký potok Brook Valley – field exercise. Duration: 5 hours (By bus to Račice, then by walk to Jedovnice). Natural environment, geological structure, archaeological finds of remnants of the extinct ancient settlement Bystřec. The settlement can be reached from the place of abode by foot in half-a-day).	
Traditional manufacture of pearl-shell buttons – Duration: 6 hours (Field exercise. Visit to the museum in Senetářov with exhibits of the way of living and bread winning in this part of the Dražanská vrchovina Upland).	

Possible visit to a singular chapel).
Issue of environment protection on the boundary and in the Protected Landscape Area of Moravian Karst (see recreation and tourism – chalet site, examination of water, soil, observation of negative phenomena during outings, etc.).
Examination of water – sampling, laboratory work. Duration: 3 hours (Examination of organoleptic characteristics, filtering of solid particles and establishment of their origin, pH establishment, establishment of salt content by evaporation, conductivity, coarse distinction of hardness, reference establishment of the degree of pollution, chemical consumption of oxygen, establishment of selected ions and substances).
Examination of soil – sampling, laboratory work. Duration: 3 hours (Thumb test, establishment of soil minerals, water permeability, water percolation, establishment of soil extract pH, establishment of selected ions).
Fauna in the surrounding – collection, catch, determination, preparation. Duration: 3-7 hours (Possible return for lunch and continuation). Flora in the surrounding – collection, determination, herbarium work. Establishment of the geobiocoenological condition of selected areas. Duration: 3-7 hours.
Visit to the Balcarka Cave – on foot, snack along – route length 9 km. Duration: 7 hours. (Study of superficial karst phenomena on the way. The longer variant counts with a visit to the Upper bridge at the Macocha abyss, possible study of the impact of tourism onto the visited area).
Visit to the Punkevní Caves or the Sloupsko-šošůvské Caves – on foot, snack along – route length 18 km. Duration: 8 hours (Programme is similar as in the Balcarka Cave)

Future teachers should have developed skills and knowledge necessary for their work with pupils and students. This education goals are to:

1. Learn to describe a geographical characteristic of a small area
 - find out in a map and write geographical position of the village Jedovnice
 - find out and mark coordinates of the base camp using GPS
 - according to a tourist map count an air distance between the village Jedovnice and the border of the city Brno
2. Use geographical skills during the fieldwork in the terrain
 - work with a compass, different types of maps, aerial photographs and orthophotos maps
 - map different situations into basic maps at the scale of 1:10 000
 - create road profile and path length derived from tourist maps
 - map tourist path into thematic maps
 - draw panoramic sketch
 - observe changes in the landscape using historic and current aerial photographs and remap according to the current situation
 - observe weather changes, temperature measuring
 - take and describe pictures
 - work with nature materials
 - learn the safety of the movement in the terrain and legal enactment for fieldwork outside the school
3. Find suitable activities which can be used for pupils' skills development

From student-teacher feedback, integrated fieldwork provides a contribution for their education but their work does not end with completion of worksheets. Cooperation between participating teachers is more valuable than the perfection of worksheets because it is a team-based activity whether they experience collective planning. An important part of the fieldwork is walking through the terrain which contributes also to ideas about a healthy lifestyle.

A virtual part of the textbook for integrated fieldwork has been created within the university development project (Figure 1). It is based on the 3D digital landscape model, showing the area of fieldwork with marked stations of participating subjects linked into individual worksheets and photographs (Figure 2).

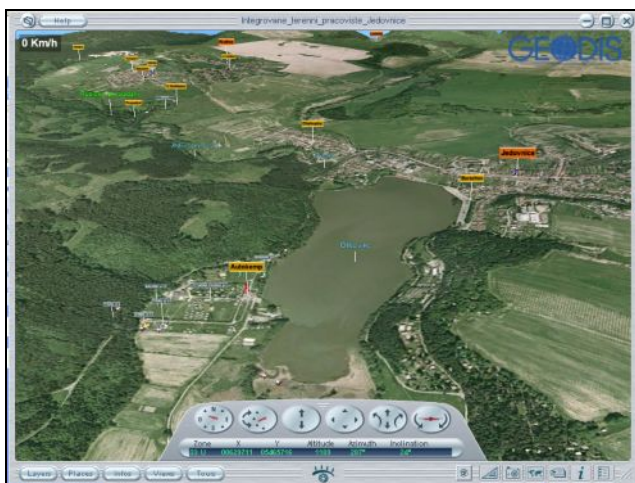


Figure 1. Navigation panel of the virtual part of the Jedovnice fieldwork textbook

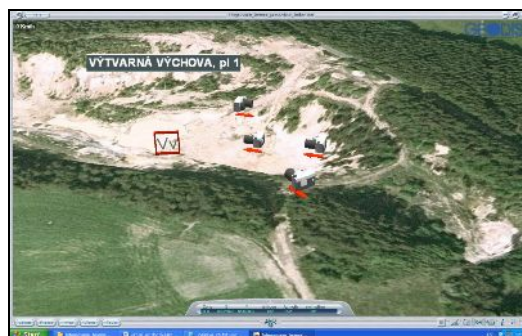


Figure 2: Field station for the arts

Future Plans for Environmental Education

A common factor which allows the integration of all subjects is landscape study. According to previous experiences from environmental education we suggest following modules which will be the base for further collective discussion:

1. Historic and geographical module
 - landscape now and before, changes in the landscape, landscape remaking
 - analysis of historic maps, photographs, aerial photos, rests of the medieval settlements, cultural memories in the region
 - understanding to genius loci
2. Geographical and historic module with contribution of physics and arts
 - influence of natural conditions on human activities in the region (SWOT analysis)
 - legacy to current generation – visible traces
 - thematic mapping using GPS, distance measuring, data visualization in GIS
 - impact of recreation and tourism on the landscape (multicriterial analysis)
3. Biological and geographical module with contribution of chemistry
 - What lives and grows in the water and on the meadow?
 - movement according to a map, marking information
 - samples of water and soil taking, chemical analysis, state of the environment
4. Geographical and biological module with contribution of chemistry
 - What lives and grows in the forest? How people manage the forest resources?
 - forest reconstruction using historic maps
 - building nature's classroom

Environmental geography

Environmental geography is a new subject and now it is being prepared as an essential subject for new study programme. It will be aimed at specific themes of human activities and their interaction with the landscape as well as the aspects of the physical geography. Students will have the opportunity to learn how to assess human impacts, decide if the activity is beneficial for the region or adverse. One of the topics will be focused on the importance or harmfulness of the tourism. On one side students will evaluate and present data sets necessary for further

assessing such as specific environmental area value, tourism potential and tourism infrastructure load on the other side they will compare each region using geostatistical methods (correlation, regression) and suggest the best solution (Ruda, 2008).

Conclusion

The quality of environmental education takes a long time to develop and depends on the willingness and creative imagination of participating authors. Overloading eco-centricity should not be a part of this education, but it should focus on creating outputs from all participating subjects. Fundamental subjects must not be forgotten because they benefit from being part of the complex pieces which can be put together to complete the puzzle. An important part is also represented by the use of information technologies. Nowadays technological innovation is in progress and we are putting our efforts into establishing a mobile laboratory for geoinformatics. This will be another step in improving fieldwork because it enables us to add more tasks for data collecting using pocket computers with GPS and sophisticated programmes such as ArcPad.

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